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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,618	03/16/2004	Susumu Noda	39.040	2617

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JUDGE PATENT FIRM
RIVIERE SHUKUGAWA 3RD FL.
3-1 WAKAMATSU-CHO
NISHINOMIYA-SHI, HYOGO, 662-0035
JAPAN

EXAMINER

BLEVINS, JERRY M

ART UNIT	PAPER NUMBER
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2883

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/708,618

Applicant(s)

NODA ET AL.

Examiner

Jerry Martin Blevins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/16/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Amendment to Specification is accepted. Objection to Specification is withdrawn.

Terminal Disclaimer

The terminal disclaimer filed on 09/16/2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted to Application number 10/708,124 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Double Patenting rejection of claims 1-11 is hereby withdrawn.

Response to Arguments

Applicant's arguments filed 08/12/2005 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, specifically, Srinivasan, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants' argument that Srinivasan never teaches point defect geometry is not persuasive. Although it is acknowledged that Srinivasan does not teach the identical

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point defect geometry of the applicants' claims, Srinivasan nevertheless teaches a point defect geometry (as specified in the previously submitted section 3, line 3 on page 673 and line 6 of the abstract, page 670). The identical point defect geometry is, in fact, taught in the applied primary reference of Akahane, as referenced in the previous office action. However, the primary reference fails to teach the alteration of this point defect geometry. Srinivasan teaches that the geometry of a point defect (which is not limited to any one particular geometry, as applicants admit is taught on page 684) can be dimensionally altered. The rejection of the claims was, and is still, to the modification of Akahane by the teachings of Srinivasan in a 35 USC 103 obviousness-type rejection.

The applicants' arguments of teaching away are not persuasive. Srinivasan does not teach that the present modification, set forth in applicants' claims, leads to the destruction of the invention of Akahane. Neither does Akahane suggest that such a modification would destroy the invention. In fact, Akahane suggests that the modification to include geometries of more than two holes increases the quality factor of the cavity (Table 1). The mere suggestion that a different modification could be beneficial does not warrant teaching away.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

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reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In the present instance, Akahane teaches the identical point defect geometry of the present application while Srinivasan teaches that the geometry of a point defect can be dimensionally altered in order to reduce radiation loss. No knowledge gleaned only from the applicant's disclosure was used in order to conclude an obviousness-type rejection.

Claim Rejections - 35 USC § 103

Claims 1-11 are rejected under 35 U.S.C. 103(a) as being obvious over Akahane, et al, "Design of a channel drop filter by using a donor-type cavity with high-quality factor in a two-dimensional photonic crystal slab", Applied Physics Letters, March 3, 2003, pages 1341-1343, in view of Srinivasan and Painter, "Momentum space design of high-Q photonic crystal optical cavities", Optics Express, July 29, 2002, pages 670-684.

Regarding Claim 1, Akahane teaches a two-dimensional photonic crystal configured by an arrangement, in a regular section of a two-dimensional lattice of points defined in a slab (page 1341, column 1, lines 1-2), of low-refractive-index substances having a small refractive index relative to the slab (page 1341, column 1, line 9 teaches that the low-refractive-index substances are air, while page 1342, column 1, line 22 teaches that the slab has a refractive index of 3.4) and being of predetermined identical dimension and shape (Figure 1), a cavity made from a point defect within the two-

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dimensional crystal, wherein: the point defect contains a plurality of three or more neighboring lattice points (specifically three as seen in Figure 1, L3 and T3), and in the plurality of three or more lattice points, the low-refractive-index substances are missing from the arrangement (page 1341 column 2, line 19).

Akahane does not teach that at least one of the low-refractive-index substances, that would otherwise be arranged to correspond to at least one among those lattice points being nearest the point defect, is dimensionally altered from its predetermined dimension. However, Srinivasan teaches that the geometry of a point defect and the surrounding holes in a two-dimensional photonic crystal can be altered in order to reduce the vertical radiation loss from the photonic crystal slab (page 673, section 3, line 3 and page 670, Abstract, line 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teachings of Srinivasan, that is to dimensionally alter at least one of the lattice points nearest the point defect, to modify the teachings of Akahane. The motivation would have been to reduce vertical radiation loss in the slab.

Regarding Claim 2, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane but does not teach the further limitation that at least one among the lattice points being secondarily adjacent the point defect also is dimensionally altered from its predetermined state. However, the above reference to surrounding holes taught by Srinivasan can reasonably be interpreted as applying to secondarily adjacent lattice points, so the above obviousness argument applies to Claim 2, as well.

Regarding Claim 3, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches a point defect consisting of exactly three lattice points (referenced above), which is, by definition, fewer than six lattice points.

Regarding Claim 4, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane does not teach that the wavelength of light that resonates in the cavity is adjustable in dependency upon the dimension and shape of the point defect. However, Srinivasan teaches that the cavity will support various resonant modes that depend on the nature of the point defect (page 673, section 3, line 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teachings of Srinivasan, that is that the resonate wavelength of the light in the cavity is adjustable depending on the dimension and shape of the point defect, to modify the teachings of Akahane. The motivation would have been to confine light of a wide bandwidth.

Regarding Claim 5, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches that the plurality of lattice points which form the point defect are lined in a line segment (page 1341, Figure 1, L3).

Regarding Claim 6, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches that the low-refractive-index substances are filled into columns perforating the slab (page 1341, Figure 1).

Regarding Claim 7, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches that the lattice points of the two dimensional lattice are arrayed in a triangular lattice (page 1341, column 1, line 8).

Regarding Claim 8, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches that the slab has a refractive index of 2.0 or greater. (Specifically, the slab index of refraction is given as 3.4 on page 1342, column 1, line 22).

Regarding Claim 9, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches that the low-refractive-index substances are air (page 1341, column 1, line 9).

Regarding Claim 10, Akahane in view of Srinivasan teaches the limitations of the base claim 1. Akahane also teaches a channel add/drop filter comprising at least one waveguide from a line defect within a two-dimensional photonic crystal, the cavity being disposed adjacent the waveguide, within a separation in which an electromagnetically reciprocal effect is produced between the cavity and waveguide (page 1341, Figure 1(a)). However, Akahane does not teach the combination of the above waveguide with the cavity as set forth in claim one, but rather Akahane teaches the above waveguide adjacent to a single point defect cavity. Akahane does teach that a three-hole point defect cavity has a higher Quality factor than its one-hole counterpart (Table 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Akahane in order to create a channel add/drop filter, as specified in Claim 10, that has a greater Quality factor than the one actually taught by Akahane. The motivation would have been to increase the Quality factor of the filter.

Regarding Claim 11, Akahane in view of Srinivasan teaches the limitations of the base claim 10. Akahane does not teach a plurality of cavities where the cavities differ

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from one another in resonant frequency. However, Srinivasan, as mentioned above (page 673, section 3, line 3) teaches that the resonant frequency of the cavity depends on the dimension and shape of the point defect. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teaching of Srinivasan, that a plurality of cavities can differ from each other in resonant frequency depending on the dimension and shape of the cavity point defect, to modify the add/drop filter taught by Akahane. The motivation would have been to broaden the bandwidth of the add/drop filter.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Martin Blevins whose telephone number is 571-272-8581. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMB


Frank G. Font
Supervisory Patent Examiner
Technology Center 2800